passing the cooling air through an air gap between the axial side of the rotor and the stator;

guiding the cooling air through the axial rotor duct to a center of the rotor;

reversing a direction of the cooling air;

passing the cooling air out of an other axial rotor duct to the air-cooling source; and

recooling the cooling air.

18. (New) A method for air-cooling a high voltage rotating electric machine according to claim 17, further comprising a step of:

guiding a predetermined portion of the cooling air passing through the coil-end section of the stator to an end of the rotor.

19. (New) A method for air-cooling a high voltage rotating electric machine according to claim 18, wherein:

the predetermined portion is 30%.

20. (New) A method for air-cooling a high voltage rotating electric machine according to claim 17, further comprising a step of:

rotating the cooling air entering the coil-end section of the stator, so as to create at least one of a vortex of air and a turbulence of air in the coil-end section of the stator.

21. (New) A method for air-cooling a high voltage rotating electric machine according to claim 17, further comprising a step of:

guiding the cooling air in the coil-end section of the stator with a screen.

22. (New) A method for air-cooling a high voltage rotating electric machine according to claim 17, further comprising a step of:

separating the cooling air exiting the rotor from the cooling air in the coil-end section of the stator.

23. (New) A method for air-cooling a high voltage rotating electric machine according to claim 17, further comprising a step of:

pressurizing the cooling air exiting the rotor with a fan and a diffuser.

24. (New) A method for air-cooling a high voltage rotating electric machine according to claim 17, further comprising:

applying all steps to the opposite axial side of the rotor.

25. (New) A method for air-cooling a high voltage rotating electric machine according to claim 17, wherein:

the winding is comprised of a cable having a flexible electric conductor with a casing configured to contain an electric field formed around the flexible electric conductor.

26. (New) A high voltage rotating electric machine, comprising:

a stator with a first coil end section and a second coil end section;

a stator winding; and

a rotor having a rotor center, with field windings surrounded by a plurality of ducts, and configured to be cooled by air flowing axially through the plurality of ducts,

wherein said high voltage rotating electric machine is configured to be cooled with a circulation of cooling air passed from a cooling unit through the coil end section to an air gap between the stator and the rotor to the rotor center via the plurality of ducts, and back to the cooling unit.

27. (New) A high voltage rotating electric machine according to claim 26, further comprising:

a fan connected to the rotor; and

a diffuser connected to the fan.

28. (New) A high voltage rotating electric machine according to claim 26, wherein:

said high voltage rotating electric machine is configured so that a cooling airflow is axially forced into the air gap toward the rotor center from the first coil end section of the stator and the second coil end section of the stator.

29. (New) A high voltage rotating electric machine according to claim 26, wherein:

the stator winding is comprised of a high voltage cable having a flexible electric conductor with a casing configured to contain an electric field formed around the flexible electric conductor.

30. (New) A high voltage rotating electric machine according to claim 29, wherein:

the casing comprises an insulation system having an inner semiconductor layer disposed on the flexible electric conductor, a solid insulation layer disposed on the inner semiconductor layer, and an outer semiconductor layer disposed on the solid insulation layer, wherein the outer semiconductor layer is configured to have an electric conductivity higher than the solid insulation layer and is connected to a node having at least one of a ground potential and a low voltage potential so as to contain the electric field formed around the flexible electric conductor.

31. (New) A high voltage rotating electric machine according to claim 30, wherein:

the inner semiconducting layer is configured to have an electric conductivity lower than the flexible electric conductor and to substantially equalize an electric field formed on an outer surface of the inner semiconducting layer.

32. (New) A high voltage rotating electric machine according to claim 30, wherein:

the solid insulation layer is comprised of a polymer.

33. (New) A high voltage rotating electric machine, comprising:

a winding of a cable with a flexible electric conductor and an insulation having two semiconductor layers and a solid insulation layer;